



BURNERS  
BRULEURS  
BRENNER  
QUEMADORES  
BRUCIATORI

# MANUAL FOR

- INSTALLATION
- OPERATION
- MAINTENANCE

## LIGHT OIL BURNERS

**G18 G-.SP**  
**PG25 G-.SP**  
**PG30 G-.TN**

M03978CA Rev. 00 10/99

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## PREFACE

**THIS MANUAL IS SUPPLIED AS AN INTEGRAL AND ESSENTIAL PART OF THE PRODUCT AND MUST BE DELIVERED TO THE USER.**

**INFORMATION INCLUDED IN THIS SECTION ARE DEDICATED BOTH TO THE USER AND TO PERSONNEL FOLLOWING PRODUCT INSTALLATION AND MAINTENANCE.**

**THE USER WILL FIND FURTHER INFORMATIONS ABOUT OPERATING AND USE RESTRICTIONS, IN THE SECOND SECTION OF THIS MANUAL. WE HIGHLY COMMEND TO READ IT.**

**CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.**

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### 1) GENERAL INTRODUCTION

The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel.

Qualified personnel means those having technical knowledge in the field of components for civil or industrial heating systems, sanitary hot water generation and particularly service centres authorised by the manufacturer.

Improper installation may cause injury to people and animals, or damage to property, for which the manufacturer cannot be held liable.

\* Remove all packaging material and inspect the equipment for integrity.

In case of any doubt, do not use the unit - contact the supplier.

The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc), should not be left within the reach of children, as they may prove harmful.

\* Before any cleaning or servicing operation, disconnect the unit from the mains by turning the master switch OFF, and/or through the cut-out devices that are provided.

\* Make sure that inlet or exhaust grilles are unobstructed.

\* In case of breakdown and/or defective unit operation, disconnect the unit. Make no attempt to repair the unit or take any direct action.

Contact qualified personnel only.

Units shall be repaired exclusively by a servicing centre, duly authorised by the manufacturer, with original spare parts.

Failure to comply with the above instructions is likely to impair the unit's safety.

To ensure equipment efficiency and proper operation, it is essential that maintenance operations are performed by qualified personnel at regular intervals, following the manufacturer's instructions.

\* When a decision is made to discontinue the use of the equipment, those parts likely to constitute sources of danger shall be made harmless.

\* In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.

\* For all the units that have been modified or have options fitted then original accessory equipment only shall be used.

\* This unit shall be employed exclusively for the use for which it is meant. Any other use shall be considered as improper and, therefore, dangerous.

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer.

### 2) SPECIAL INSTRUCTIONS FOR BURNERS

\*The burner should be installed in a suitable room, with ventilation openings complying with the requirements of the regulations in force, and sufficient for good combustion.

\* Only burners designed according to the regulations in force should be used.

\* This burner should be employed exclusively for the use for which it was designed.

\* Before connecting the burner, make sure that the unit rating is the same as delivery mains (electricity, gas oil, or other fuel).

\*Observe caution with hot burner components. These are, usually, near to the flame and the fuel pre-heating system, they become hot during the unit operation and will remain hot for some time after the burner has stopped.

\* When the decision is made to discontinue the use of the burner, the user shall have qualified personnel carry out the following operations:

a) Remove the power supply by disconnecting the power cord from the mains.

b) Disconnect the fuel supply by means of the hand-operated shut-off valve and remove the control handwheels from their spindles.

#### Special warnings

\* Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance firebox.

\* Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:

a) set the burner fuel flow rate depending on the heat input of the appliance;

b) set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;

c) check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;

d) make sure that control and safety devices are operating properly;

e) make sure that exhaust ducts intended to discharge the products of combustion are operating properly;

f) on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;

g) make sure that a copy of the burner use and maintenance instructions is available in the boiler room.

\* In case of repeated burner shut-downs, do not continue re-setting the unit manually. Contact qualified personnel to take care of such defects.

\* The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

### 3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

#### 3A) ELECTRICAL CONNECTION

\* For safety reasons the unit must be efficiently earthed and installed as required by current safety regulations.

\* It is vital that all safety requirements are met. In case of any doubt, ask for an accurate inspection of electrics by qualified personnel, since the manufacturer cannot be held liable for damages that may be caused by failure to correctly earth the equipment.

\* Qualified personnel must inspect the system to make sure that it is adequate to take the maximum power used by the equipment shown on the equipment rating plate. In particular, make sure that the system cable cross section is adequate for the power absorbed by the unit.

\* No adaptors, multiple outlet sockets and/or extension cables are permitted to connect the unit to the electric mains.

An omnipolar switch shall be provided for connection to mains, as required by the current safety regulations.

The use of any power-operated component implies observance of a few basic rules, for example:

- do not touch the unit with wet or damp parts of the body and/or with bare feet;

- do not pull electric cables;

- do not leave the equipment exposed to weather (rain, sun, etc.) unless expressly required to do so;

- do not allow children or inexperienced persons to use equipment;

\* The unit input cable shall not be replaced by the user.

In case of damage to the cable, switch off the unit and contact qualified personnel to replace.

\* When the unit is out of use for some time the electric switch supplying all the power-driven components in the system (i.e. pumps, burner, etc.) should be switched off.

### 3B) FIRING WITH GAS, GASOIL OR OTHER FUELS

#### GENERAL

\* The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.

\* Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.

\* Before the burner is commissioned, qualified personnel should inspect the following:

a) the fuel supply system, for proper sealing;

b) the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;

c) the burner firing system, to make sure that it is supplied for the designed fuel type;

d) the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;

e) the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.

\* When the burner is to remain idle for some time, the fuel supply tap or taps should be closed.

#### SPECIAL INSTRUCTIONS FOR USING GAS

\* Have qualified personnel inspect the installation to ensure that:

a) the gas delivery line and train are in compliance with the regulations and provisions in force;

b) all gas connections are tight;

c) the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.

\* Do not use gas pipes to earth electrical equipment.

\* Never leave the burner connected when not in use. Always shut the gas valve off.

\* In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

#### Precautions if you can smell gas

a) do not operate electric switches, the telephone, or any other item likely to generate sparks;

b) immediately open doors and windows to create an air flow to purge the room;

c) close the gas valves;

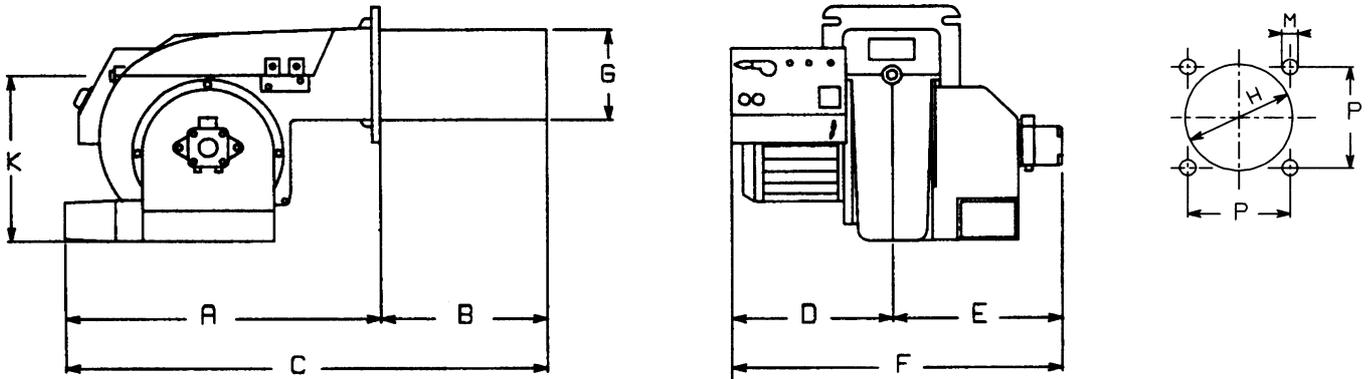
d) contact qualified personnel.

\* Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.



**OVERALL DIMENSIONS**

	A	B	BL	C	CL	D	E	F	G	K	H	P	M
PG25SP	515	155	345	660	850	267	260	520	133	290	125	155	M10
PG30SP													



**PERFORMANCE CURVES**

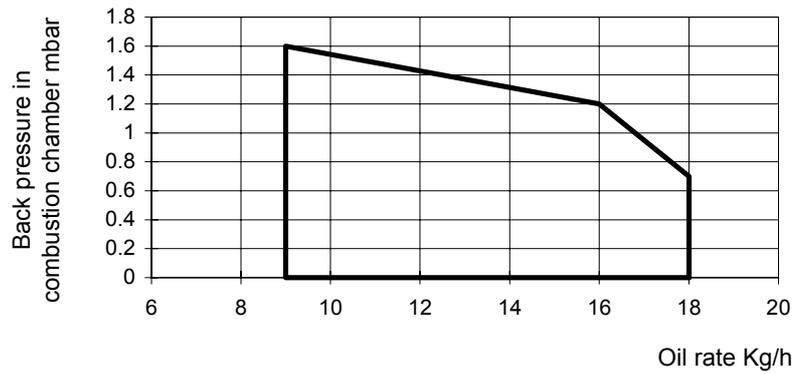


Fig. 2

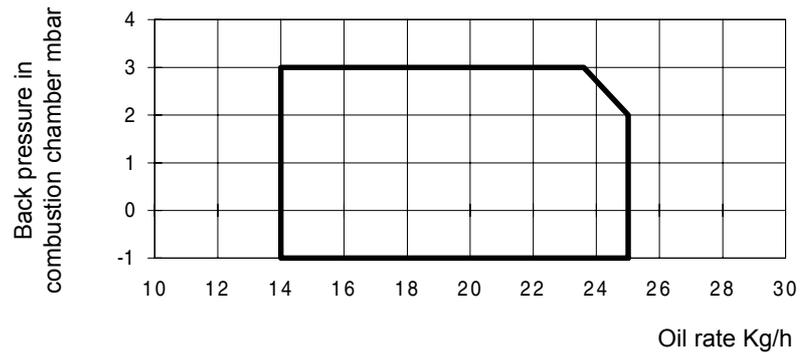


Fig. 3

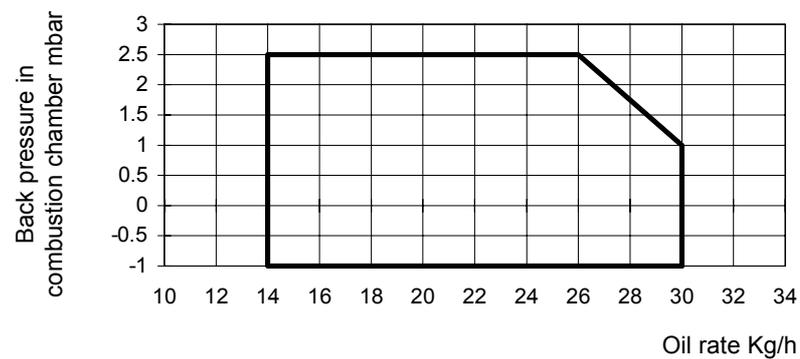


Fig. 3a

## MOUNTINGS AND CONNECTIONS

The burners are despatched in cardboard packages.

The packaging contains the following items:

- 1 burner;
- 2 flexible light oil tubes;
- 1 light oil filter;
- 1 gasket to be inserted between the burner and the boiler;
- 1 this manual, the Guarantee Certificate and the test certificate.

To get rid of the burner's packing and in the event of scrapping of the latter, follow the procedures laid down by current laws on disposal of materials.

## FITTING BURNER TO BOILER

### G18SP

Attach the flange of the burner to the boiler with the reference as shown in picture. This allows a correct inclination towards the combustion chamber

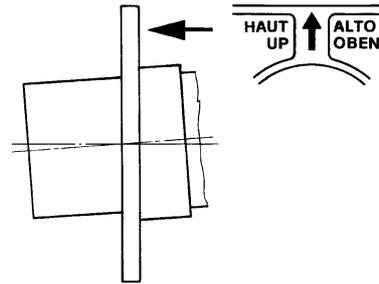


Fig. 4

### PG25SP - PG30TN

After fitting the burner to the boiler see that the space between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).

#### Key

- 1) Burner
- 2) Fixing nut
- 3) Washer
- 4) Seal
- 5) Stud bolt
- 6) Sightglass cleaning tube
- 7) Blast tube

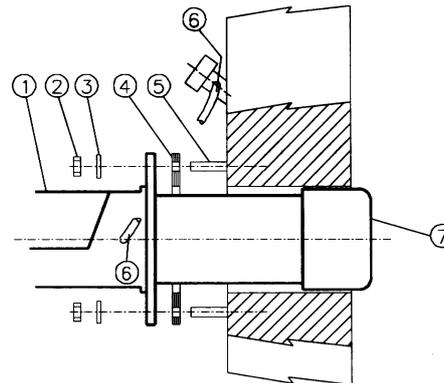
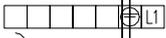


Fig. 4a

G18SP

PG25SP

PG30TN



MA

TS

L

Fig. 5

Fig. 5a

Fig. 5b

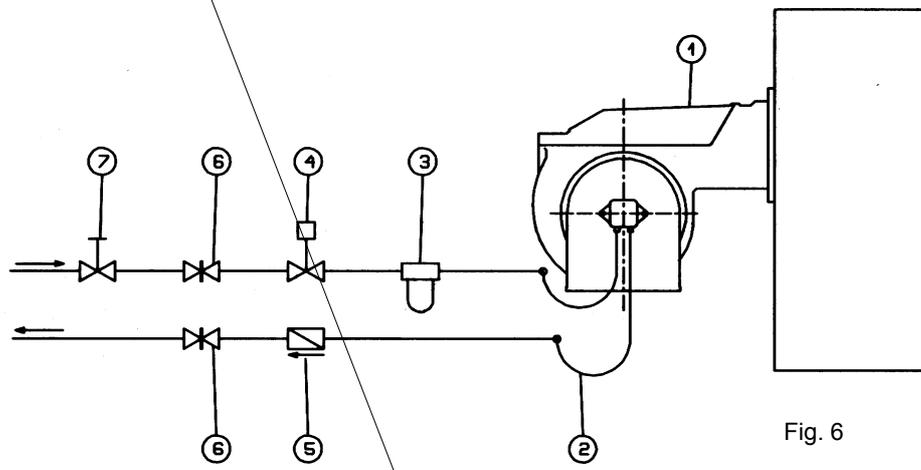


Fig. 6

## SETTINGS

### Burners G18SP - PG25SP

These burners are fitted with a double-regulation pump. The flame control device, a twin-stage one, after the pre-purge stage, energized the valve EV1 and the burner starts up.

After few seconds, the intervention of the second stage caused the energizing of the valve EV2, so the burner is feeded with a maximum pressure of about 18 bar.

### Burner PG30TN

Before carry out the settings, start-up the light oil pump proceeding as follows:

- start up the burner, light the photoresistor after the solenoid valve opening and leak the air from the manometer gauge.

Before starting up the burner, be sure that the return pipe to the tank is not obstructed; any obstruction would cause the pump seal to break.

### Light oil flow rate setting

The light oil rate is adjusted by chosing a nozzle with appropriate dimensions and setting the inlet pump pressure; to chose the nozzle, refer to the tables below.

## LIGHT OIL PUMP SETTINGS

### Burners G18SP - PG25SP

Adjust the pump for the ignition, to a pressure value of about 8-10 bar (see fig. 7).

After 10", the safety device drives the second stage; set the pump to a pressure value of 18 bar, by means of the regulation screw.

### Burner PG30TN

Set the pump to a pressure value from 10 to 14 bar, depending by the nozzle fitted (see table 2).

## SELECTING THE OIL NOZZLE

Table 1 - Burners G18SP - PG25SP

GPH	BAR										
	8	9	10	11	12	13	14	15	16	17	18
1.75	6.02	6.38	6.73	7.05	7.37	7.67	7.96	8.24	8.51	8.77	9.02
2.00	6.88	7.29	7.69	8.06	8.42	8.77	9.10	9.42	9.72	10.02	10.31
2.25	7.74	8.20	8.65	9.07	9.47	9.86	10.23	10.59	10.94	11.28	11.60
2.50	8.59	9.12	9.61	10.08	10.53	10.96	11.37	11.77	12.16	12.53	12.89
3.00	10.31	10.94	11.53	12.09	12.63	13.15	13.64	14.12	14.59	15.03	15.47
3.50	12.03	12.76	13.45	14.11	14.74	15.34	15.92	16.48	17.02	17.54	18.05
4.00	13.75	14.59	15.37	16.13	16.84	17.53	18.19	18.83	19.45	20.05	20.63
4.50	15.47	16.41	17.30	18.14	18.95	19.72	20.47	21.18	21.88	22.55	23.21
5.00	17.19	18.23	19.22	20.16	21.05	21.91	22.74	23.54	24.31	25.06	25.78

Table 2 - Burner PG30TN

GPH	BAR		
	10	12	14
3.50	13.45	14.74	15.92
4.00	15.37	16.84	18.19
4.50	17.30	18.95	20.47
5.00	19.22	21.05	22.74
5.50	21.14	23.16	25.01
6.00	23.06	25.26	27.29
6.50	24.98	27.37	29.56
7.00	26.91	29.47	31.84

## LIGHT OIL PUMPS

### SUNTEC AS57C

Suction height:	0.5 bar
Advised value to prevent air separation from oil:	0.35 bar
Rated speed:	max. 2850 rpm
Operation viscosity:	from 2 to 12 cSt
Inlet pressure:	max. 2 bar

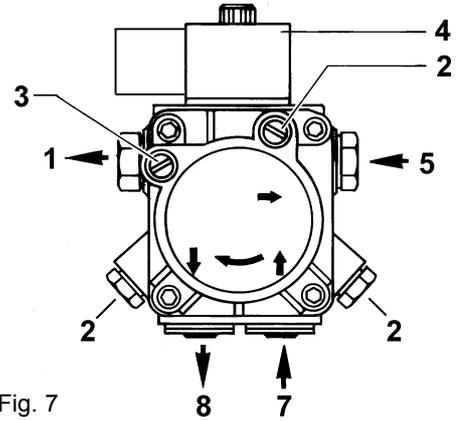


Fig. 7

### DELTA VM2RL2

Suction height:	0.5 bar
Advised value to prevent air separation from oil:	0.35 bar
Rated speed:	max. 3500 rpm
Operation viscosity:	from 1.5 to 50 cSt
Inlet pressure:	0.7 - 1.5 bar

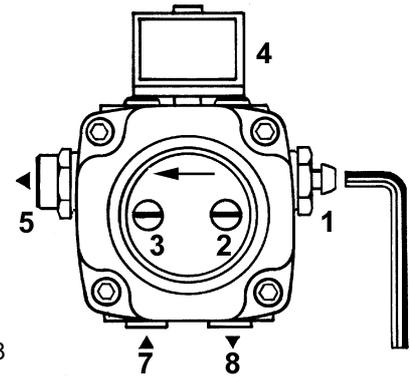


Fig. 8

#### Key

- 1 Pressure regulator
- 2 Manometer
- 3 Vacuum gauge
- 4 Solenoid valve
- 5 Nozzle
- 6 Supply to nozzle
- 7 Suction
- 8 Return

### SUNTEC AT2 45C

Suction height:	0.45 bar
Advised value to prevent air separation from oil:	0.35 bar
Rated speed:	max. 3600 rpm
Operation viscosity:	from 2 to 12 cSt
Inlet pressure:	max. 2 bar

- 1 Low pressure regulation (first stage)
- 2 Manometer
- 3 Vacuum gauge
- 4 Lockout solenoid valve
- 4a High-low pressure solenoid valve
- 5 To nozzle
- 6 High pressure regulation (second stage)
- 7 Suction
- 8 Return (with internal by-pass plug)

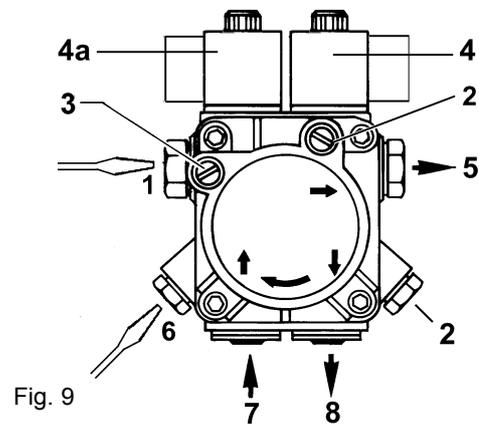


Fig. 9

**AIR FLOW ADJUSTMENT**

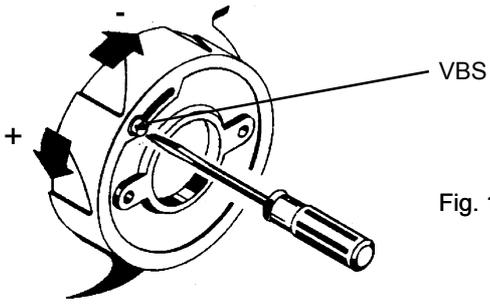


Fig. 10

**Burner G18SP**

Loose the screw VBS and rotate the air damper in the desired position, to set the air flow.  
At the end of settings, tight the screw VBS.

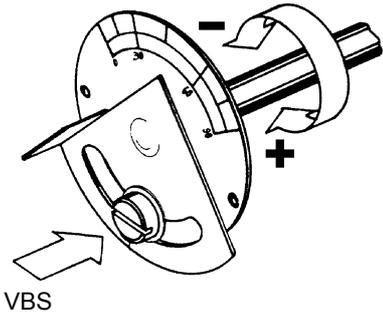


Fig. 11

**Burners PG25SP - PG30TN**

Loose the screw VBS and set the air flow, working directly on the air damper.  
At the end of settings, tight the screw VBS.

**COMBUSTION HEAD ADJUSTMENT**

The burner is factory-adjusted with the combustion head in the "max" position (maximum output).  
Move back the combustion head towards the "MIN" position, turning the screw VRT clockwise.

**G18SP**

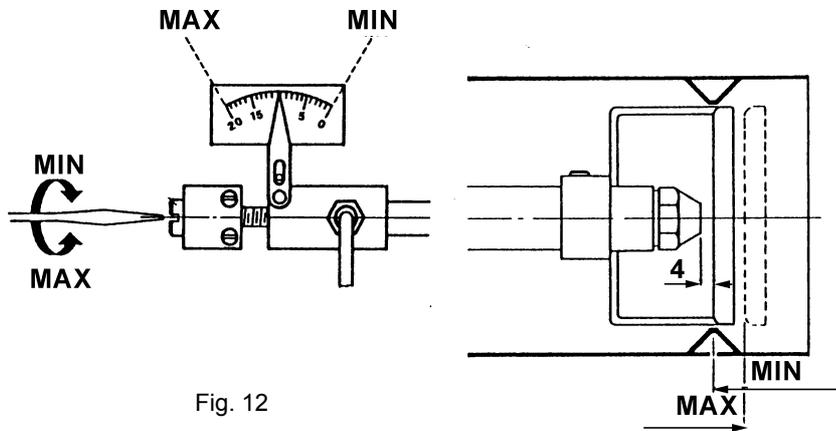


Fig. 12

Fig. 12

**PG25SP - PG 30TN**

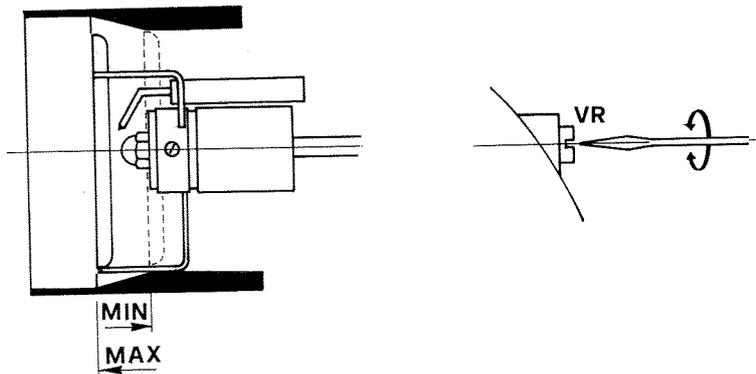


Fig. 12a

**LIMITATIONS OF USE**

**THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY CONNECTED TO A HEAT GENERATOR (E.G. BOILER, HOT AIR GENERATOR, FURNACE, ETC.), ANY OTHER USE IS TO BE CONSIDERED IMPROPER AND THEREFORE DANGEROUS.**

**THE USER MUST GUARANTEE THE CORRECT FITTING OF THE APPLIANCE, ENTRUSTING THE INSTALLATION OF IT TO QUALIFIED PERSONNEL AND HAVING THE FIRST COMMISSIONING OF IT CARRIED OUT BY A SERVICE CENTRE AUTHORISED BY THE COMPANY MANUFACTURING THE BURNER. A FUNDAMENTAL FACTOR IN THIS RESPECT IS THE ELECTRICAL CONNECTION TO THE GENERATOR'S CONTROL AND SAFETY UNITS (CONTROL THERMOSTAT, SAFETY, ETC.) WHICH GUARANTEES CORRECT AND SAFE FUNCTIONING OF THE BURNER.**

**THEREFORE ANY OPERATION OF THE APPLIANCE MUST BE PREVENTED WHICH DEPARTS FROM THE INSTALLATION OPERATIONS OR WHICH HAPPENS AFTER TOTAL OR PARTIAL TAMPERING WITH THESE (E.G. DISCONNECTION, EVEN PARTIAL, OF THE ELECTRICAL LEADS, OPENING THE GENERATOR DOOR, DISMANTLING OF PART OF THE BURNER).**

**DO NOT EVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.**

**OPERATE ONLY THE MAIN SWITCH, WHICH THROUGH ITS EASY ACCESSIBILITY AND RAPIDITY OF OPERATION ALSO FUNCTIONS AS AN EMERGENCY SWITCH, AND ON THE RE-SET BUTTON.**

**IN THE EVENT OF REPEATED LOCKOUTS, DO NOT PERSIST WITH THE RE-SET BUTTON AND CONTACT QUALIFIED PERSONNEL WHO WILL PROCEED TO ELIMINATE THE MALFUNCTION.**

**WARNING: DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST TO THE GENERATOR (COUPLING FLANGE) CAN BECOME VERY HOT, AVOID TOUCHING THEM SO AS NOT TO GET BURNT.**

## PART III: MAINTENANCE

At least once a year carry out the following maintenance procedures.

If servicing is on a seasonal basis, it is recommended at the end of the season; routine service should be carried out every months.

**Note: Any operation on the burner must be carried out with the main electricity switched off.**

### PERIODICAL SERVICING

- Clean and examine the oil filter cartridge and replace it if necessary;
- Examine the condition of the oil flexible pipeworks and check for possible leaks;
- Clean and examine the filter inside the oil pump;
- Dismantle, examine and clean the combustion head. When reassembling respect the measures reported in table 3.
- Examine the ignition electrodes and their ceramic insulators, adjust and replace if necessary (fig. 13);
- Dismantle and clean the oil nozzle (important: use solvents for cleaning and not metal utensils).

At the end of the maintenance procedures replace the burner, light it and check the shape of the flame: if in doubt replace the nozzle(s);

where the burner is used intensively it is recommended to replace the nozzles at the beginning of the operating season;

- Examine and carefully clean the flame detector photoelectric cell and replace if necessary. If in doubt light the burner and then check the detector circuit as shown in Fig. 14.

### Correct position of electrodes and combustion head (G18SP)

Prepare a stable surface where lying the burner during maintenance.

To gain access to the combustion head and to the nozzles, loose the screw which lock the blast tube and remove it from the part that remains fixed to the boiler.

To guarantee a good ignition, respect the measures indicated in table 3.

Be sure to lock the screw that fix the electrodes group, before reassembly the burner.

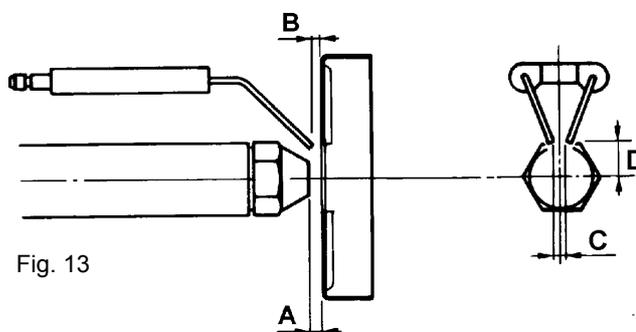


Fig. 13

Table 3

		A	B	C	D
<b>G18SP</b>	60°	6	4	4	6
	45°	10	5	4	6
<b>PG28SP</b>	60°	8	4	4	6
	45°	12	5	4	6
<b>PG30TN</b>	60°	8	4	4	6
	45°	12	5	4	6

### Removal of the combustion head (PG25SP - PG30TN)

- Remove the cap C;
  - Take out the photoresistance from its housing;
  - Unscrew the floating pipe-fitting E from the oil pipe, using 2 spanners, to avoid to loose the pipe-firrings from the distribution block;
  - Remove the screws V and unscrew the screw VRT until the threaded rod AR is free;
- Remove the complete assembly as shown in figure 13a.

Note: To re-assemble reverse the order of procedures descibed above.

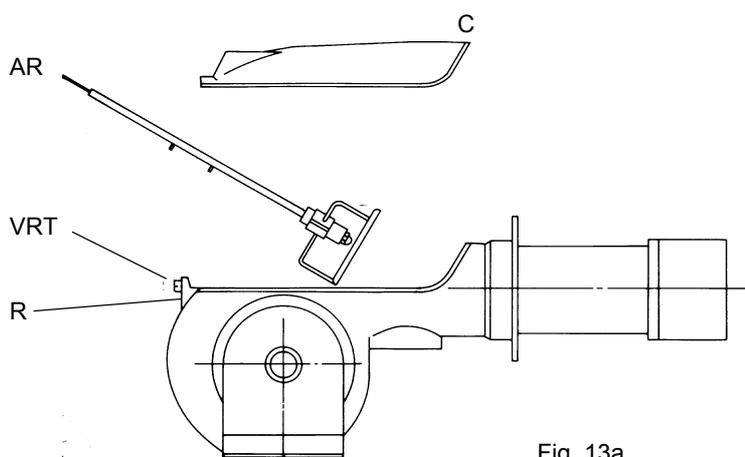
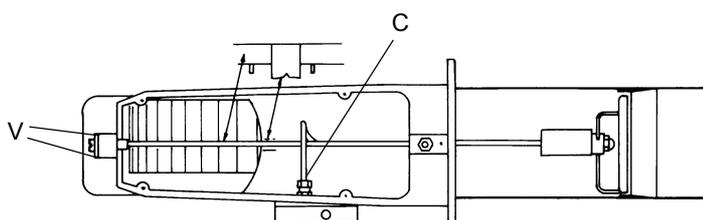


Fig. 13a



## CHECK OF THE IONIZATION CURRENT

To check the detector signal follow the procedure shown in fig. 14.

If the signal is not within the prescribed range, check the electrical contacts; check also that the combustion head is clean and the photoelectric sensor is correctly positioned. Replace it if necessary.

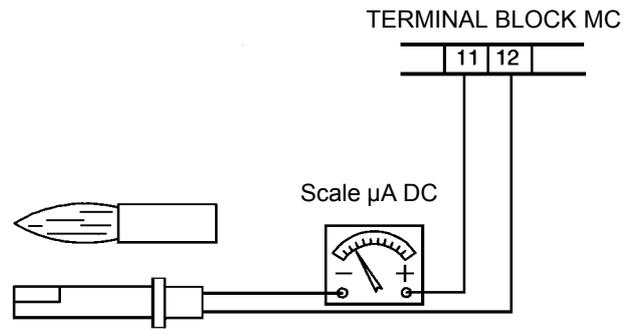
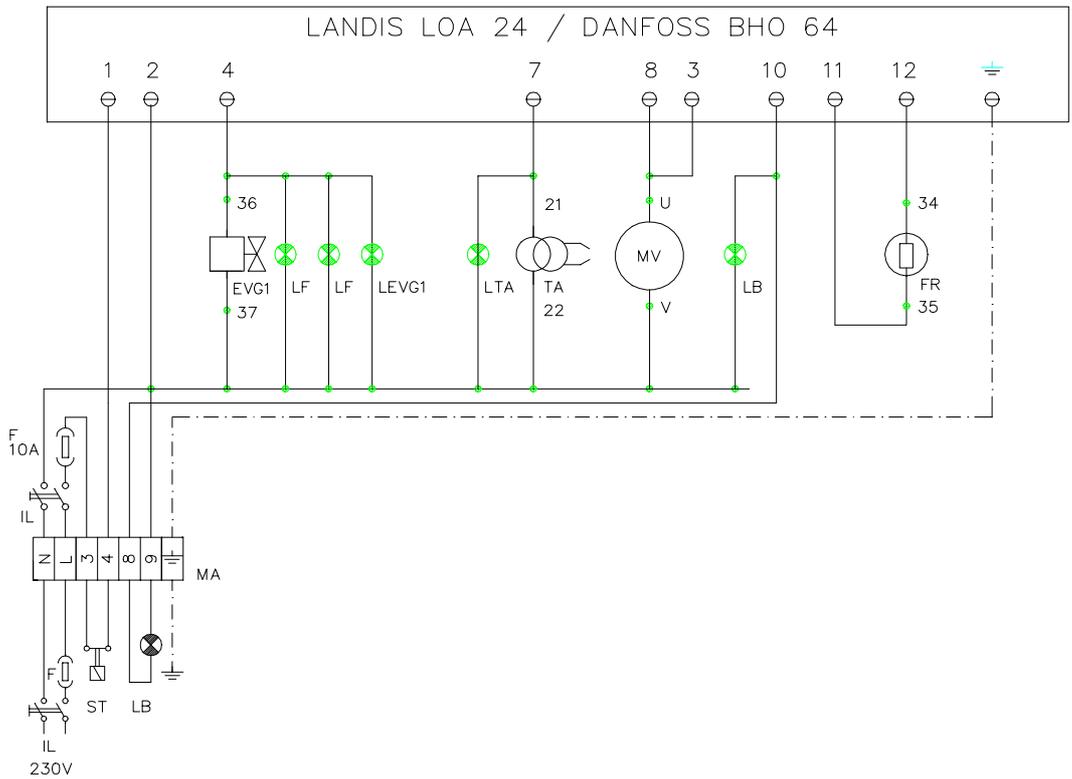


Fig. 14

Minimum current



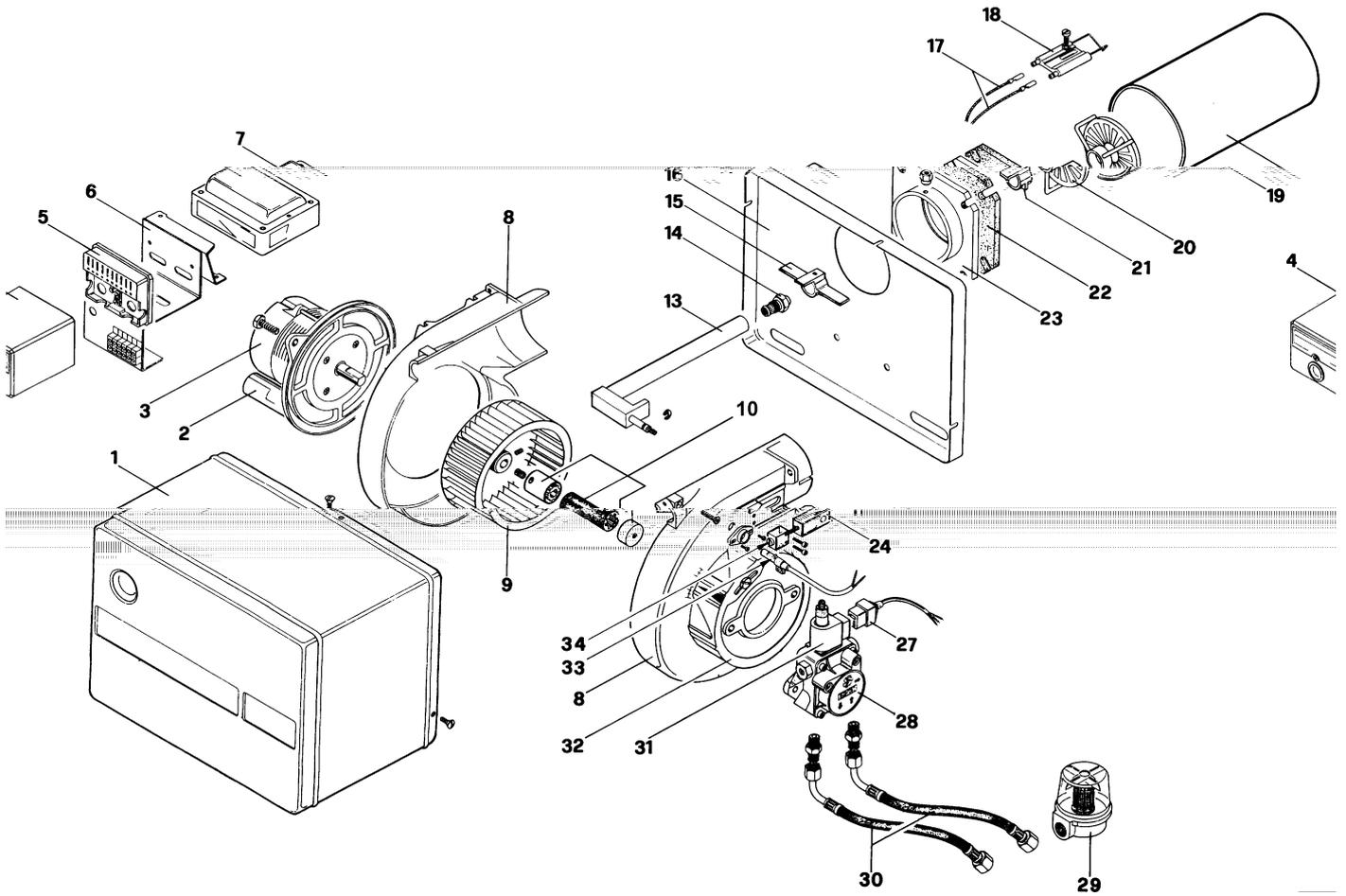
**ELECTRICAL DIAGRAM code 04-574 BURNER PG30TN**



- 1 - Electric supply 230V 50Hz 2N a.c.
- 2 - Don't reverse Phase and Neutral
- 3 - Make sure that the burner is properly heated

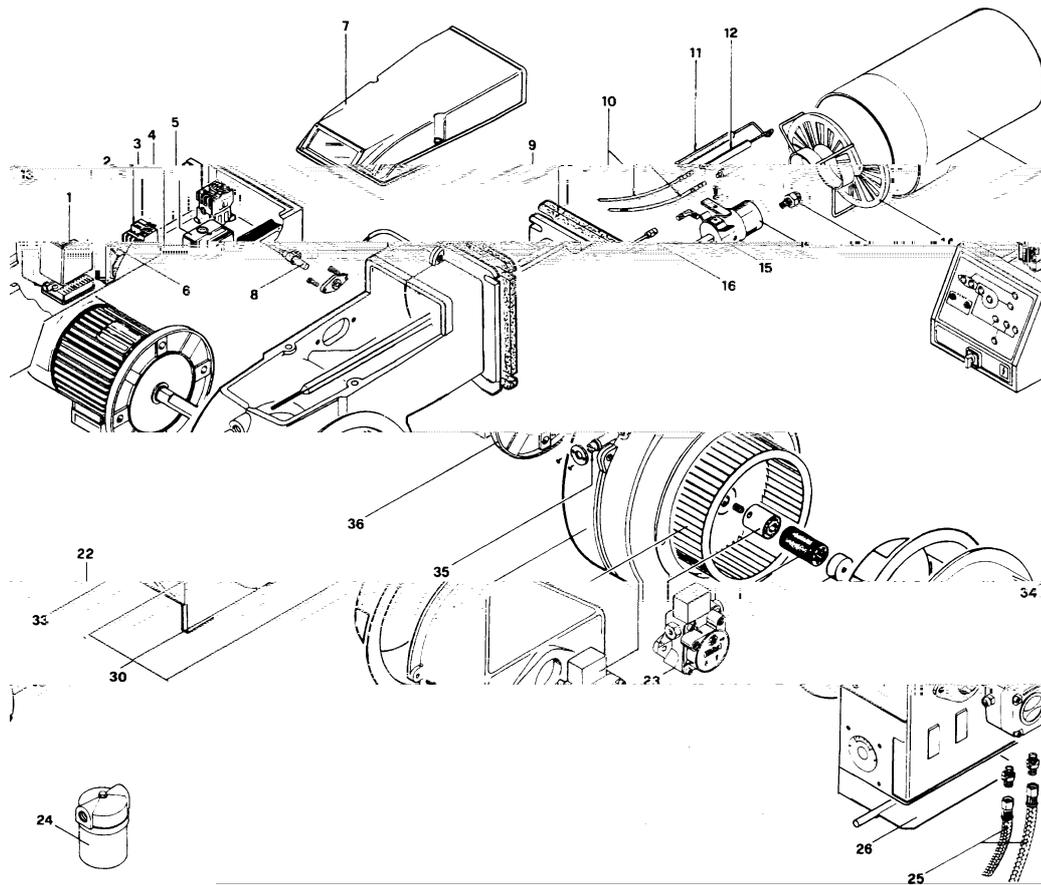
- EVG1 Light oil solenoid valve I<sup>st</sup> stage
- EVG2 Light oil solenoid valve II<sup>nd</sup> stage
- F Fuses
- FR Photoresistor
- IL Main switch
- L Phase
- LF Burner operation light
- LB Burner lockout light
- LEVG1 EVG1 opening signalization light
- LEVG2 EVG2 opening signalization light
- LOA24/BOA64 Flame monitor device
- MA Power supply terminal block
- MC Terminal block for burner components connection
- LTA Ignition transformer light
- MV Fan motor
- N Neutral
- ST Thermostats or pressure switches
- TA Ignition transformer

**SPARE PARTS BURNER G18SP**



POS.	DESCRIPTION	CODE	POS.	DESCRIPTION	CODE
1	HOUSING	3010019	19	BLAST TUBE	3090055
2	CONDENSER	6030004	20	COMBUSTION HEAD	3060115
3	MOTOR	2180009	21	ELECTRODE SUPPORT	2280016
4	FLAME CONTROL DEVICE LOA24	2020445	22	GASKET	2110031
5	SOCKET FOR LOA24	2030409	23	FLANGE	2100011
6	SUPPORT BRACKET	2430004	24	DISTRIBUTION MOVING BLOCK	2320012
7	TRANSFORMER	2170106	25	LIGHT OIL PIPE	2220125
8	BURNER CASING	2050228	27	CONNECTOR	6200008
9	FAN	2150004	28	SUNTEC AT2 45C PUMP	2590147
10	COMPLETE JOINT	254...	29	FILTER	2090016
13	ATOMIZER	3020020	30	FLEXIBLE HOSE	2340001
14	NOZZLE	261..	31	SOLENOID VALVE COIL	2580402
15	ATOMIZER SUPPORT	2280006	32	AIR DAMPER	1010702
16	BOTTOM	2010102	33	PHOTORESISTOR QRB1B	2510008
17	IGNITION CABLES	6050122	34	ADJUSTING SCREW	2320011
18	IGNITION ELECTRODE	2080203			

**SPARE PARTS BURNERS PG25SP - PG30TN**



POS.	DESCRIPTION	PG25SP	PG30TN
1	ELECTRIC BOARD	6100086	6100086
2	THERMAL RELAY	---	---
3	SOCKET FOR FLAME CONTROL DEVICE	2030415	2030415
4	FLAME CONTROL DEVICE	2020445	2020445
5	CONTACTOR	---	---
6	IGNITION TRANSFORMER	2170107	2170107
7	TOP COVER	2210103	2210103
8	LANDIS PHOTORESISTOR	2510003	2510003
9	GASKET	2110004	2110004
10	IGNITION CABLES	6050109	6050109
11	LONG ELECTRODE	---	---
12	SHORT ELECTRODE	2080208	2080208
13	STANDARD BLAST TUBE	3090033	3090033
13	LONG BLAST TUBE	3090035	3090035
14	DIFFUSER	3060179	3060179
15	NOZZLE	261...	261...
16	STANDARD NOZZLE SUPPORT	3020009	3020009
16	LONG NOZZLE SUPPORT	3020017	3020017
17	STANDARD LIGHT OIL PIPE	3071003	3071003
17	LONG LIGHT OIL PIPE	3071021	3071021
22	COIL FOR SUNTEC PUMP	2580402	2580402
22	COIL FOR DELTA PUMP	---	2580406
23	SUNTEC PUMP	2590147	2590144
23	DELTA PUMP	---	2590009
24	LIGHT OIL FILTER	2090016	2090016
25	FLEXIBLE HOSES	2340001	2340001
26	AIR DAMPER	2140005	2140005
30	COMPLETE JOINT FOR SUNTEC PUMP	2540109	2540109
30	COMPLETE JOINT FOR DELTA PUMP	---	2540103
33	FAN	2150006	2150006
34	BURNER CASING	2050117	2050117
35	HEAD ADJUSTING SCREW	2320503	2320503
36	ELECTRIC MOTOR	2180704	2180704

**FLAME CONTROL DEVICE LANDIS LOA24  
LIGHT OIL PUMPS**

**LANDIS AUTOMATIC CONTROLLER LOA24  
FOR LIGHT OIL BURNERS**

**Use**

LOA... safety devices are intended for use in conjunction with QRB... photoresistors, for lighting and controlling low capacity forced air diesel burners with max. capacity 30 kg/h in accordance with standard DIN 4787.

The One or two flames are lit, depending on electrical connections, with or without post-ignition.

**Performance**

The controllers just need plugging in, so they can be mounted in almost any position: on the burner, on the electrical panel or on the control panel. The casing is made of robust heat-resistant plastic and contains:

- the thermic programmer operating a multiple switch control system with ambient temperature compensator
- flame signal amplifier with flame relay
- warning light indicating lockout and associated sealed reset button.

The plug-in socket, also made of robust heat-resistant plastic, contains the 12 terminals and also:

- 3 neutral terminals, ready wired up to terminal 2
- 4 earth terminals for earthing the burner
- 2 supplementary terminals numbered "31" and "32".

The socket has two openings at the bottom for the leads; 5 others with threaded connection for cable holders PG11 or 3/4UNP for non-metallic sleeves are located on a mobile stuffing box, one on either side and 3 on the front.

There are two flexible metal tongues on the sides of the socket for mounting.

To dismantle it only requires gentle pressure with a screw driver in the slot of the mounting guide.

The base dimensions of the socket are exactly the same as for types LAB/LAI and there is no difference in the diameter of the reset button, the two mounting screws and the flange of the burner earth.

**Safety at low voltage levels**

Safety devices against any reduction in the mains voltage operate on a special electronic circuit which, in the event of the power supply falling below 165V~, stops the burner switching on without releasing the fuel and locks out the apparatus.

**Wiring diagram of the programme**

To ensure correct wiring it is essential to observe local standards and follow the instructions of the burner manufacturer with regard to assembly and start-up.

- t2 Safety time
- t3n Post-ignition time
- t4 Interval between the flame lighting and energising of solenoid 2a at terminal 5

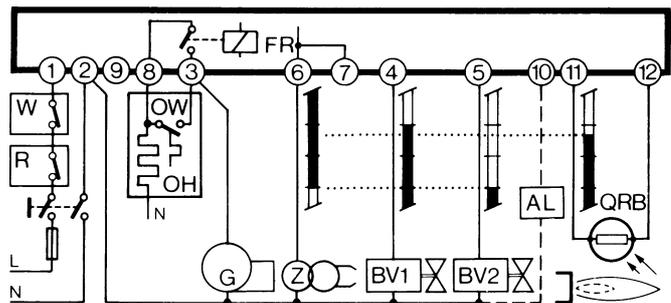
**Internal layout**

- AL Optical alarm
- BV. Fuel valve
- EK Reset button
- FR Flame relay
- fr Flame relay contacts
- FS Flame alight signal
- G Burner motor
- K Flame relay anchor to delay the tzi command in the event of a premature flame signal or endorse it where the signal is correct.
- OH diesel pre-heater
- OW Operational all-clear contact
- QRB Photo-resistant cell (flame detector)
- R Thermostat or pressure switch
- TZ Thermo-electric programmer (bimetal system)
- tz.. TZ contacts
- V Flame signal amplifier
- W Safety thermostat or pressure switch
- Z Ignition transformer

**These are safety devices**

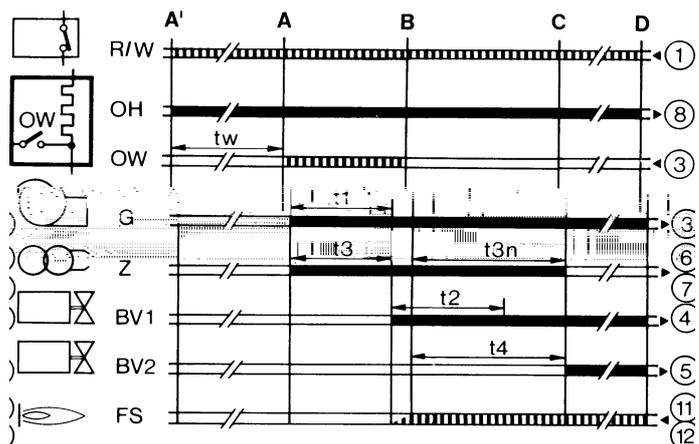
**To tamper with them in any way may have unforeseeable consequences !**

**Do not open them!**



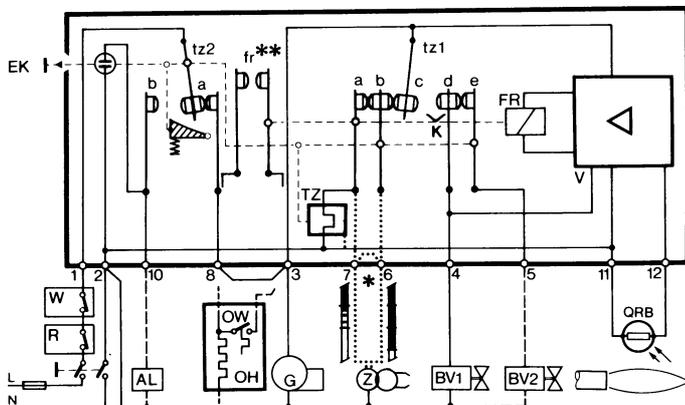
**Program's key:**

- ▬ Controller output signals
- ▬ Required input signals
- A' Burner start up with diesel pre-heater OH
- A Burner start-up without diesel pre-heater
- B Flame lit
- C Normal operation
- D Normal stop through R
- tw Oil pre-heating time until operational all clear given through contact OW
- t1 Pre-purge time
- t3 Pre-ignition time



## Technical characteristics

Voltage	220V-15%..240V+10% or 100V -15%...110V+10%
Frequency	50...60Hz +/- 6%
External fuse	max.10A slow action
Contact flow:	
- terminal 1	5A
- terminal 3	5A (incl.capacity absorbed by motor and pre-heater)
Terminal flow:	
- terminals 4, 5 & 10	1A
- terminals 6&7	2A
- terminal 8	5A
Absorbed cap	3VA
Protection	IP40
Permitted temp:	
operational	-20...+60°C
transport & storage	-50...+60°C
Emplacement	any
Mass (weight)	controller 180 g socket 50 g AGK accessories 12 g



## Commands in the event of operational interference

### - Stray light/premature ignition

During pre-purge and/or pre-ignition there should be no flame signal. If there is a flame signal, eg from premature ignition due to a faulty solenoid, external light, short circuit in the photoresistor or wiring, malfunction in the flame signal amplifier, etc., at the end of pre-purge and safety time the controller locks out the burner and stops the fuel flow even during safety time.

### - Absence of flame

If there is no flame at the end of safety time the controller locks out immediately.

### - Absence of flame during operation

If there is no flame during operation the controller cuts off the supply of fuel and automatically initiates a fresh start-up programme: at the end of t4 the start-up programme ends. Whenever there is a safety stop, terminals 3-8 and 11 are de-energised in less than 1 second; at the same time a remote lockout signal is transmitted through terminal 10. The controller can be reset after c. 50 seconds.

## DELTA "VM" PUMPS

In the VM series of DELTA pumps the pressurised flow of oil P is shut off by a built in solenoid and may therefore be switched on for startup of the motor pre-purge) or off before the motor itself switches off (flame goes out instantly when the spray from the nozzle stops).

Oil pressure is regulated and kept constant by the piston valve which is activated when the light comes on to signify that the oil discharged exceeds nozzle capacity and is being returned to the tank (twin-pipe system) or being returned to the suction pipe through a bypass in the pipe (single-pipe system).

In this model both the single-pipe and twin-pipe versions have automatic priming. It is recommended that in either case a standard external filter be installed.

All twin-pipe models can be used as single-pipe systems with the simple removal of a nylon plug and by closing the return pipe.

## Technical data

Oil viscosity	1,5÷50 cSt
Oil temperature	50°C
Pressure range	2÷10 bars 4÷15 bars 8÷20 bars 10÷125 bars
Suction vacuum	max.0,5 bars
Suction pressure	max.0,7 bars
Return pressure	max.1,5 bars
Rotational speed	max.3500 rpm
Filter	stainless steel mesh 110 micron, 20 cm <sup>2</sup>
Mounting	Hub 32, shaft 8 (DIN 24220) On request: flange, hub 54, shaft 7/16"

## Hydraulic connections

Return suction	1/8"G 1/4"G (1/8"G only VI,V2)
Delivery	1/8"G vacuum gauge 1/8"G
Rate	VMI, VM2: max.0,1 Nm; VM3: 0,18 Nm

## SUNTEC AS oil pumps

- Oil
- Flow up to 75 l/h (c.600,000 kcal/h - 700 kW)
- Twin-pipe system
- Single-pipe system

### Technical data

Mounting	On flange or hub in accordance with standards DIN 24220 and ISO/TC 109 SC 3 DP 5062F
Threads	round-headed in accordance with ISO R 228-NFE 03005(DIN2S9)
Supply and return	R 1/4"
Delivery	R 1/8"
Pressure	R 1/8"
On cover	R 1/8"
Valve function	Pressure control and cut out
Filter	area 34 cm <sup>2</sup> , 120 micron
Shaft	8 mm in acc. with DIN 24220
Plug	Inserted
By-pass	Insert for twin-pipe, remove for single-pipe system
Weight	1,8 kg - hub-mounted 1,9 kg - flange-mounted
Rotation and delivery position (view from shaft side)	A - clockwise rotation/RH delivery C - anticlockwise rotation/LH delivery

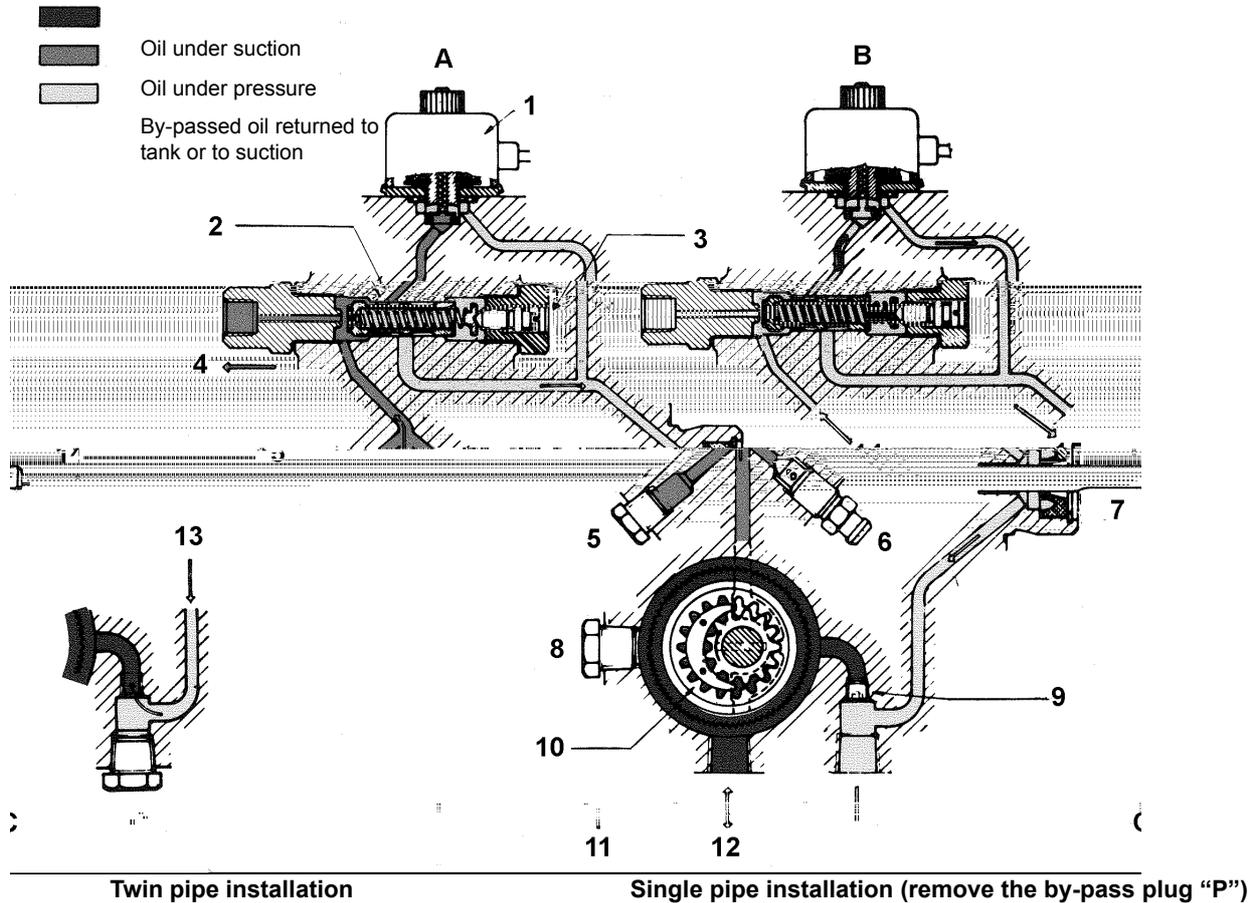
### Hydraulic data

Operational pressure range	7-14 bars adjustable 9-15 bars adjustable (for AS67)
Calibration	9 bars at factory
Viscosity at 20°C	2-12mm <sup>2</sup> /s (cSt)
Supply pressure	max.2 bars
Return pressure	max.2 bars
Suction	max. vacuum 0,5 bars; recommended 0,35 bars to avoid separation of oil and gas
Rotational speed	2850 rpm
Max. oil temperature	70°C
Torque	1,0cm - daN
Absorbed capacity	see motor curves

### Electrical data

Solenoid voltage	20V +10%-15%; 50/60Hz
Absorbed capacity	9VA
Length of coil cable	600mm
Length of plug cable	600mm
Cable	Ø6 mm with cross section of 0,75 mm <sup>2</sup>

A	Closed solenoid valve	6	Escape valve
B	Open solenoid valve (NO)	7	Shaft seal
C	Closed return	8	Vacuum gauge port
1	Solenoid valve	9	By-pass plug "P"
2	Pressure regulating valve	10	Gear set
3	Pressure adjustment	11	Inlet
4	To nozzle	12	Return
5	Pressure gauge port	13	Back to suction



## Operation

The gear-set draws oil from the tank through the built-in filter and transfers it to the valve that regulates the oil pressure or the nozzle line. All oil which does not go through the nozzle line will be dumped through the valve back to the return line or, if it is a one-pipe installation, back to the suction port in the gear-set.

The hydraulic valve has a cut-off function besides regulating the nozzle pressure. Contrary to the AN pump, the valve has no bleed slot. The function of the bleed slot is taken over by the solenoid valve. When the solenoid valve is non-activated, the by-pass channel between the pressure and return sides of the valve is open. No pressure will then be built up to open the valve. It does not matter which speed the gear set has. When the solenoid is activated, this by-pass channel will be closed and because of the full speed of the gear set, the pressure necessary to open the valve will be built up very rapidly which gives a very sharp cut-on function. When the burner stops, the solenoid opens the by-pass at the same moment which drains all the oil down to the return and the nozzle valve closes immediately. This gives a very sharp cut-off function.

The cut-on and off can be regulated regardless of motor speed and has an extremely fast response. The torque requirement is low up to full motor speed.

### SUNTEC AT oil pumps

- Oil
- Twin-pipe system
- Single-pipe system
- Twin feed

#### Technical data

Mounting	On hub Ø 32mm, in accordance with standards DIN 24220
Threads	round-headed in accordance with ISO R 228-NFE 03005 (DIN259)
Supply and return	R 1/4"
Delivery	R 1/8"
Pressure	R 1/8"
On cover	R 1/8"
Valve function	Pressure regulation
Filter	Area 34 cm <sup>2</sup> , mesh 120 micron
Shaft	Ø 8 mm in acc. with DIN 24220
By-pass	Insert for twin-pipe, remove for single-pipe system
Weight	1,3 kg
Rotation and delivery position (viewed from shaft side)	D - counterclockwise rotation/right delivery C - counterclockwise rotation/left delivery

#### Hydraulic data

Operational pressure range to the nozzle	4 - 25 bar
Calibration	22 bars at factory
Viscosity at 20°C	2-12mm <sup>2</sup> /s (cSt)
Supply pressure	max.2 bars
Return pressure	max.2 bars
Suction	max. vacuum 0,35 bars, recommended to avoid separation of oil and gas
Rotational speed	3600 rpm
Max. oil temperature	70°C
Torque	1,0 cm - daN

#### Electrical data

Solenoid voltage	220V +10%-15%; 50/60Hz
Absorbed capacity	9VA
Protection	IP50
Max. pressure	25 bar
Approved by	TUV n.1 x 23985S

## PUMP OPERATING PRINCIPLE

The gear set draws oil from the tank through the built-in filter and transfers it to the nozzle line via the cut off solenoid valve. Pressure regulation is assured by two spool valves, one for each pressure mode.

In one pipe operation, oil which is not required at the nozzle is returned directly to the gear inlet via the pressure regulating valves and the suction line flow is equal to the nozzle flow.

In two pipe operation, the by-pass plug must be fitted in the return port, which ensures that the oil dumped by the regulating valves is returned to the tank and the suction line flow is equal to the gear set capacity.

Purging on 2 pipe installations is assured by a bleed flat on the pistons. On 1 pipe installations, a high pressure connection must be loosened until the air is evacuated from the system.

Switching between low and high pressure is assured by a normally open by-pass solenoid valve. When this solenoid is non activated, a by-pass channel is open, allowing the normal operation of the low pressure valve which sets the nozzle pressure. When this solenoid is activated, the by-pass channel is closed, thus pressure will build up on both sides of the low pressure valve eliminating its effect and the high pressure valve now determines the nozzle pressure.

The blocking solenoid valve is of the normally closed type and is situated in the nozzle line.

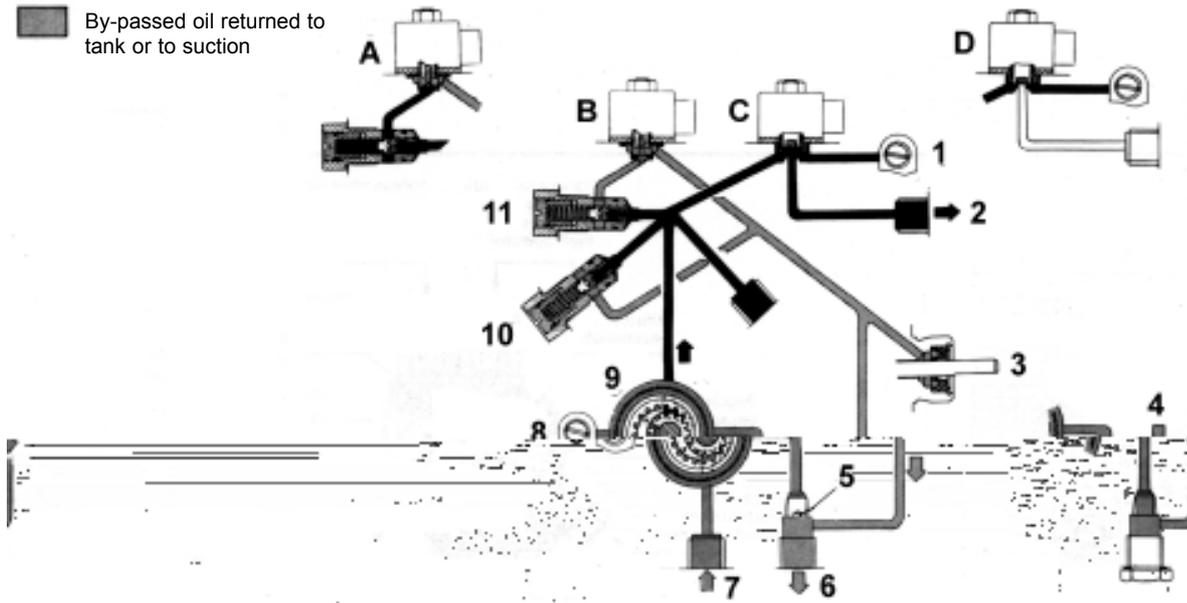
This design ensures extremely fast response and the switching can be selected according to the burner operating sequence independently from the motor speed.

When the solenoid is non-activated, the valve is closed and all oil pressurised by the gear set passes through the regulators to suction or the return line, depending upon the pipe arrangement.

As soon as the solenoid is activated, oil passes to the nozzle line at the pressure set by the pressure regulating valve.

- |   |                               |    |  |
|---|-------------------------------|----|--|
| A | Closed by-pass solenoid valve | 4  | Return to suction                        |
| B | Opened by-pass solenoid valve | 5  | By-pass plug                             |
| C | Opened cut-off solenoid valve | 6  | Return (twin pipe installation)          |
| D | Closed cut-off solenoid valve | 7  | Suction (twin pipe installation)         |
| 1 | Manometer plug                | 8  | Vacuum gauge plug                        |
| 2 | To nozzle                     | 9  | Gear                                     |
| 3 | Shaft seal                    | 10 | Hi-pressure regulator with control screw |
|   |                               | 11 | Lo-pressure regulator with control screw |

-  Oil under suction
-  Oil under pressure
-  By-passed oil returned to tank or to suction



Twin pipe installation

Single pipe installation (remove the by-pass plug "P")





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